CISCO SYSTEMS

Cisco VG224 Voice Gateway
Software Configuration Guide

C O N T E N T S

Preface

This preface discusses the objectives, audience, organization, and conventions of this software configuration guide, and where to get the latest version of this guide.

This preface presents the following major topics:

Objectives

After installing the router, use this guide to complete a basic router configuration using the setup command facility. This guide also contains information on using the Cisco IOS software to perform other configuration tasks, such as configuring a Voice-over-IP (VoIP) interface and other features.

This guide does not provide complete configuration instructions. Refer to the Cisco IOS configuration guides and command references for detailed configuration instructions. These publications are available on the Documentation CD-ROM that came with your router and on Cisco.com. See the "Obtaining Documentation" section on page x for more information.

Audience

This publication is designed for the person who will be responsible for configuring your router. This guide is intended primarily for the following audiences:

- Customers with technical networking background and experience
- System administrators who are familiar with the fundamentals of router-based internetworking, but who might not be familiar with Cisco IOS software
- System administrators who are responsible for installing and configuring internetworking equipment, and who are familiar with Cisco IOS software

Document Organization

The major sections of this document are summarized below:

Chapter	Title	Description
Chapter 1	Understanding Interface Numbering and Cisco IOS Software Basics	Provides an overview of the interface numbering conventions for the Cisco VG224. Also provides a basic understanding of Cisco IOS software.
Chapter 2	Using the setup Command	Describes how to use the setup command facility to configure your router.
Chapter 3	Configuring with the Command-Line Interface	Describes how to use the Cisco IOS software command-line interface (CLI) to configure basic router functionality.
Chapter 4	Configuring Voice over IP	Describes how to configure voice network modules with foreign exchange station (FXS) interfaces for your router.
Appendix A	Cisco VG224 Configuration Example	Provides a variety of configuration examples for the Cisco VG224-24FXS.
Appendix B	Formatting the Compact Flash Memory Cards	Provides configuration information for the Cisco compact flash memory.
Appendix C	Using the ROM Monitor	Describes how the ROM monitor works in the Cisco VG224.

Related and Referenced Documents

The documents described here are available online and on the documentation CD-ROM that you received with your router. To be sure of obtaining the latest information, you should access the online documentation.

To print a document in its original page format, access the online document, and click the PDF icon.

You can also order printed copies of documents. See "Obtaining Documentation" section on page x.

To Access Online User Documentation (PDF and HTML Formats)

From Cisco.com at **http://www.cisco.com**, under **Service & Support**, select **Technical Documents** and select **Cisco Product Documentation**.

Access User Documentation on the Documentation CD-ROM (HTML format only)

On the Documentation CD-ROM, select **Cisco Product Documentation**.

Paths to specific documents are provided below, starting at **Cisco Product Documentation**.

Tip To navigate up to the next higher level in the documentation hierarchy, click on **CONTENTS** in the navigation bar at the top of each page.

Cisco Product	Document Title
Cisco VG224 Voice Gateway	• *Cisco 224 Voice Gateway Hardware Installation Guide* • *Cisco VG224 Regulatory Compliance and Safety Information*
Cisco IOS software **Note** Refer to the modular reference publication that corresponds to the Cisco IOS software release installed on your server.	• *Cisco IOS Configuration Fundamentals Configuration Guide, Release 12.3(4)T* • *Cisco IOS Configuration Fundamentals Command Reference, Release 12.3(4)T* • *Cisco IOS Dial Technologies Configuration Guide, Release 12.3(4)T* • *Cisco IOS Wide-Area Networking Configuration Guide, Release 12.3(4)T* • *Cisco IOS IP Configuration Guide, Release 12.3(4)T* • *Cisco IOS Wide-Area Networking Command Reference, Release 12.3(4)T* • *Cisco IOS Debug Command Reference,, Release 12.3(4)T* • *Cisco IOS Software System Error Messages, Release 12.3(4)T* • *Cisco IOS Software Command Summary, Release 12.3(4)T* • *Cisco IOS Release Notes for your release*
Other documents	• Information about TL1 commands can be found in the Telcordia Technology document *Network Maintenance: Network Element and Transport Surveillance Messages*, GR-833-CORE, Issue 5, November 1996. For a reference of security-related commands (ACT-USER and CANC-USER), refer to Telcordia Technology's *Operations Applications Messages-Network Element and Network System Security Admin Messages*, TR-NWT-000835, Issue 2, January 1993.

Obtaining Documentation

Cisco provides several ways to obtain documentation, technical assistance, and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

You can access the most current Cisco documentation on the World Wide Web at this URL:

http://www.cisco.com/univercd/home/home.htm

You can access the Cisco website at this URL:

http://www.cisco.com

International Cisco websites can be accessed from this URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which may have shipped with your product. The Documentation CD-ROM is updated regularly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual or quarterly subscription.

Registered Cisco.com users can order a single Documentation CD-ROM (product number DOC-CONDOCCD=) through the Cisco Ordering tool:

http://www.cisco.com/en/US/partner/ordering/ordering_place_order_ordering_tool_launch.html

All users can order annual or quarterly subscriptions through the online Subscription Store:

http://www.cisco.com/go/subscription

Click Subscriptions & Promotional Materials in the left navigation bar.

Ordering Documentation

You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpck/pdi.htm

You can order Cisco documentation in these ways:

- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:

  http://www.cisco.com/en/US/partner/ordering/index.shtml

- Nonregistered Cisco.com users can order documentation through a local account representative by calling Cisco Systems Corporate Headquarters (California, USA) at 408 526-7208 or, elsewhere in North America, by calling 800 553-NETS (6387).

Documentation Feedback

You can submit e-mail comments about technical documentation to bug-doc@cisco.com.

You can submit comments by using the response card (if present) behind the front cover of your document or by writing to the following address:

Cisco Systems
Attn: Customer Document Ordering
170 West Tasman Drive
San Jose, CA 95134-9883

We appreciate your comments.

Obtaining Technical Assistance

For all customers, partners, resellers, and distributors who hold valid Cisco service contracts, the Cisco Technical Assistance Center (TAC) provides 24-hour-a-day, award-winning technical support services, online and over the phone. Cisco.com features the Cisco TAC website as an online starting point for technical assistance. If you do not hold a valid Cisco service contract, please contact your reseller.

Cisco TAC Website

The Cisco TAC website (http://www.cisco.com/tac) provides online documents and tools for troubleshooting and resolving technical issues with Cisco products and technologies. The Cisco TAC website is available 24 hours a day, 365 days a year.

Accessing all the tools on the Cisco TAC website requires a Cisco.com user ID and password. If you have a valid service contract but do not have a login ID or password, register at this URL:

http://tools.cisco.com/RPF/register/register.do

Opening a TAC Case

Using the online TAC Case Open Tool (http://www.cisco.com/tac/caseopen) is the fastest way to open P3 and P4 cases. (P3 and P4 cases are those in which your network is minimally impaired or for which you require product information.) After you describe your situation, the TAC Case Open Tool automatically recommends resources for an immediate solution. If your issue is not resolved using the recommended resources, your case will be assigned to a Cisco TAC engineer.

For P1 or P2 cases (P1 and P2 cases are those in which your production network is down or severely degraded) or if you do not have Internet access, contact Cisco TAC by telephone. Cisco TAC engineers are assigned immediately to P1 and P2 cases to help keep your business operations running smoothly.

To open a case by telephone, use one of the following numbers:

Asia-Pacific: +61 2 8446 7411 (Australia: 1 800 805 227)
EMEA: +32 2 704 55 55
USA: 1 800 553-2447

For a complete listing of Cisco TAC contacts, go to this URL:

http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml

TAC Case Priority Definitions

To ensure that all cases are reported in a standard format, Cisco has established case priority definitions.

Priority 1 (P1)—Your network is "down" or there is a critical impact to your business operations. You and Cisco will commit all necessary resources around the clock to resolve the situation.

Priority 2 (P2)—Operation of an existing network is severely degraded, or significant aspects of your business operation are negatively affected by inadequate performance of Cisco products. You and Cisco will commit full-time resources during normal business hours to resolve the situation.

Priority 3 (P3)—Operational performance of your network is impaired, but most business operations remain functional. You and Cisco will commit resources during normal business hours to restore service to satisfactory levels.

Priority 4 (P4)—You require information or assistance with Cisco product capabilities, installation, or configuration. There is little or no effect on your business operations.

Obtaining Additional Information

Information about Cisco products, services, technologies, and networking solutions is available from various online sources.

- Sign up for Cisco e-mail newsletters and other communications at the Cisco Subscription Center at:

  http://www.cisco.com/offer/subscribe

- Learn about modifications to or updates about Cisco products. Go to the Product Alert Tool to create a profile, and then choose those products for which you want to receive information. Go to:

  http://tools.cisco.com/Support/PAT/do/ViewMyProfiles.do?local=en

- Order the Cisco Product Quick Reference Guide, a reference tool that includes product overviews, key features, sample part numbers, and abbreviated technical specifications for many Cisco products that are sold through partners. Go to:

  http://www.cisco.com/go/guide

- Visit the Cisco Services website to learn the latest technical, advanced, and remote services available to increase the operational reliability of your network. Go to:

  http://www.cisco.com/go/services

- Visit Cisco Marketplace, the company store, for a variety of books, reference guides, documentation, and logo merchandise at:

  http://www.cisco.com/go/marketplace/

- Purchase a copy of Cisco technical documentation on a DVD, (Cisco Product Documentation DVD) from the product documentation store at:

  http://www.cisco.com/go/marketplace/docstore

- Obtain general networking, training, and certification titles from Cisco Press publishers at:

  http://www.ciscopress.com

- Read the Internet Protocol Journal, a quarterly journal published by Cisco for engineering professionals who design, develop, and operate internets and intranets. Go to:

  http://www.cisco.com/ipj

- *What's New in Cisco Product Documentation* is an online publication that provides information about the latest documentation releases for Cisco products. Updated monthly, this online publication is organized by product category:

  http://www.cisco.com/en/US/docs/general/whatsnew/whatsnew.html

- Access international Cisco websites at:

  http://www.cisco.com/public/countries_languages.shtml

C H A P T E R 1

Understanding Interface Numbering and Cisco IOS Software Basics

This chapter provides an overview of interface numbering in the Cisco VG224 voice gateway (VG). It also describes how to use the Cisco IOS software commands.

This chapter presents the following major topics:

Identifying the Cisco VG224

Figure 1-1 shows the back panel and identifies the features of the Cisco VG224.

Figure 1-1 Identifying the Cisco VG224
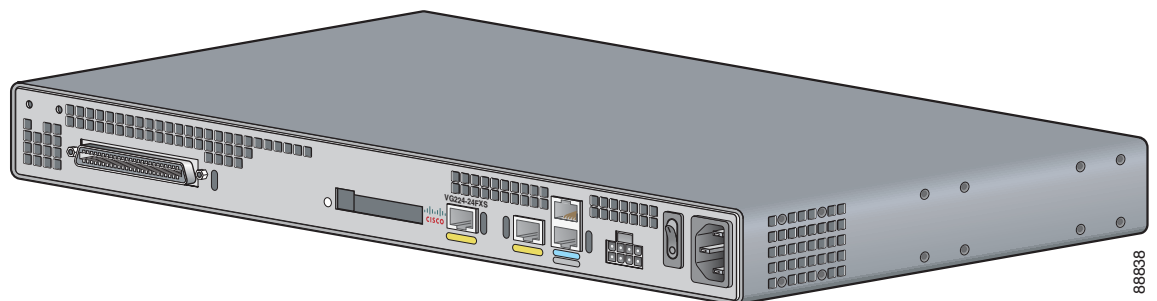
- RJ-21 analog voice interface
- FE ports: 2
- External compact flash memory card

Port Numbering Conventions

The Cisco VG224 is used as an example. See Figure 1-2 on page 1-2.

Figure 1-2   Back-Panel Functions and Options (Cisco VG224 shown)
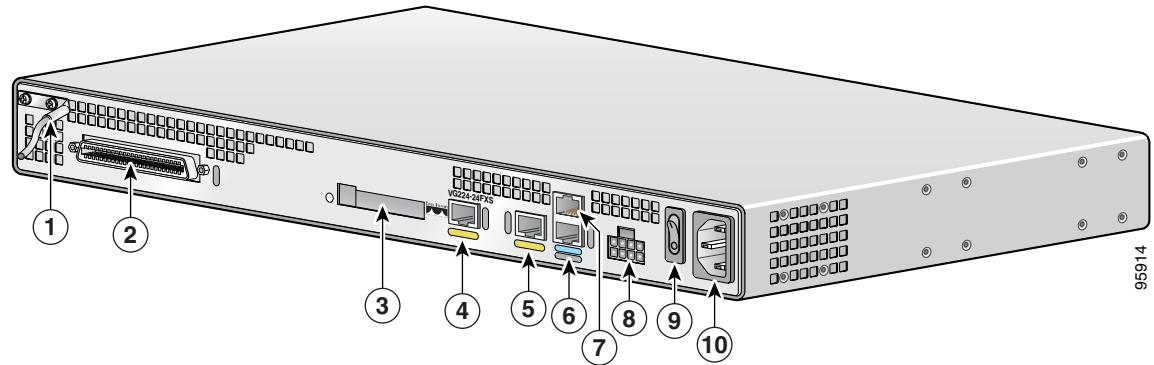
1	Chassis ground connection	6	AUX port
2	RJ-21 connector	7	Console port
3	Compact flash port	8	DC power input[1]
4	Fast Ethernet port 1	9	On/off switch
5	Fast Ethernet port 0	10	AC power input

1. This is not a redundant failover power supply connection. You must use either AC or DC.

✎
Note   The Console port is above the AUX port.

Port numbering convention for the Cisco VG224 is as follows:

*   Analog foreign exchange station (FXS) voice port numbering begins at 2/0 and extends up to 2/23.

*   An external compact flash memory card is numbered CF 0.

*   10/100BASE-T Fast Ethernet ports are numbered Fast Ethernet 0/0 and Fast Ethernet 0/1, from right to left.

Understanding Cisco IOS Software Basics

This section describes what you need to know about the Cisco IOS software before you configure the router using the command-line interface (CLI). This chapter includes the following:

- Getting Help, page 1-3
- Command Modes, page 1-3
- Undoing a Command or Feature, page 1-4
- Saving Configuration Changes, page 1-5
- Where to Go Next, page 1-5

Understanding these concepts will save time as you begin to use the CLI. If you have never used Cisco IOS software or need a refresher, take a few minutes to read this chapter before you proceed to the next chapter.

If you are already familiar with Cisco IOS software, proceed to Chapter 2, "Using the setup Command."

Getting Help

Use the question mark (?) and arrow keys to help you enter commands:

- For a list of available commands, enter a question mark:

  ```
  Router> ?
  ```

- To complete a command, enter a few known characters followed by a question mark (with no space):

  ```
  Router> s?
  ```

- For a list of command variables, enter the command followed by a space and a question mark:

  ```
  Router> show ?
  ```

- To redisplay a command you previously entered, press the up arrow key. You can continue to press the up arrow key for more commands.

Command Modes

The Cisco IOS user interface is divided into different modes. Each command mode permits you to configure different components on your router. The commands available at any given time depend on which mode you are currently in. Entering a question mark (**?**) at the prompt displays a list of commands available for each command mode. Table 1-1 lists the most common command modes.

Table 1-1   Common Command Modes

Command Mode	Access Method	Router Prompt Displayed	Exit Method
User EXEC	Log in.	`Router>`	Use the **logout** command.
Privileged EXEC	From user EXEC mode, enter the **enable** command.	`Router#`	To exit to user EXEC mode, use the **disable**, **exit**, or **logout** command.
Global configuration	From the privileged EXEC mode, enter the **configure terminal** command.	`Router (config)#`	To exit to privileged EXEC mode, use the **exit** or **end** command, or press **Ctrl-Z**.
Interface configuration	From the global configuration mode, enter the **interface** *type number* command, such as **interface serial 0/0**.	`Router (config-if)#`	To exit to global configuration mode, use the **exit** command. To exit directly to privileged EXEC mode, press **Ctrl-Z**.

Timesaver   Each command mode restricts you to a subset of commands. If you are having trouble entering a command, check the prompt, and enter the question mark (**?**) for a list of available commands. You might be in the wrong command mode or using the wrong syntax.

In the following example, notice how the prompt changes after each command to indicate a new command mode:

```
Router> enable
Password: <enable password>
Router# configure terminal
Router(config)# interface serial 0/0
Router#
%SYS-5-CONFIG_I: Configured from console by console
```

The last message is normal and does not indicate an error. Press **Return** to get the `Router#` prompt.

Note   You can press **Ctrl-Z** in any mode to immediately return to enable mode (`Router#`), instead of entering **exit**, which returns you to the previous mode.

Undoing a Command or Feature

If you want to undo a command you entered or disable a feature, enter the keyword **no** before most commands; for example, **no ip routing**.

Saving Configuration Changes

You need to enter the **copy running-config startup-config** command to save your configuration changes to nonvolatile random-access memory (NVRAM), so the changes are not lost if there is a system reload or power outage. For example:

```
Router# copy running-config startup-config
Building configuration...
```

It might take a minute or two to save the configuration to NVRAM. After the configuration has been saved, the following appears:

```
[OK]
Router#
```

Upgrading to a New Cisco IOS Release

To install or upgrade to a new Cisco IOS release, see How to Update/Upgrade Cisco IOS Software.

Cisco VG224 Deployment Scenario

Figure 1-3 shows a typical deployment scenario for the Cisco VG224 voice gateway.

Figure 1-3   Analog FXS User Interfaces with Metro Ethernet Interface
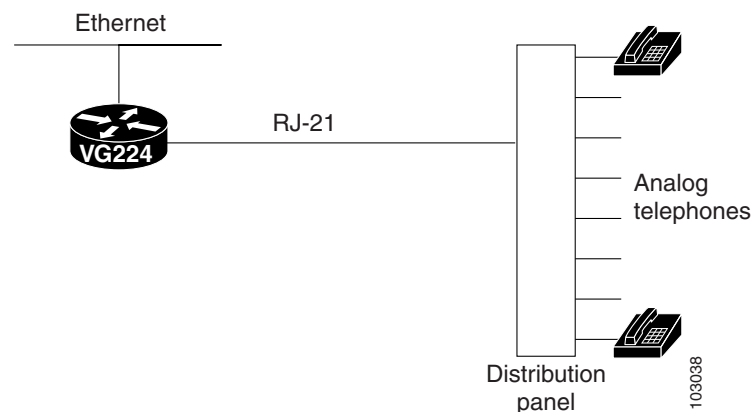
Where to Go Next

Now that you have learned some Cisco IOS software basics, you can begin to configure the router using the CLI.

Remember that:

- You can use the question mark (?) and arrow keys to help you enter commands.

- Each command mode restricts you to a set of commands. If you have difficulty entering a command, check the prompt and then enter the question mark (**?**) for a list of available commands. You might be in the wrong command mode or using the wrong syntax.

- To disable a feature, generally enter the keyword **no** before the command; for example, **no ip routing**.

- You need to save your configuration changes to NVRAM so the changes are not lost if there is a system reload or power outage.

Proceed to Chapter 2, "Using the setup Command," to begin configuring the router.

Using the setup Command

This chapter describes how to use the setup command facility to configure your Cisco VG224. The setup command facility prompts you to enter information needed to start a router functioning quickly. The facility steps you through a basic configuration, including LAN and WAN interfaces.

This chapter presents the following major topics:

- Before Starting Your Cisco VG224, page 2-1
- Using the setup Command, page 2-2
- Configuring Global Parameters, page 2-2
- Configuring Controller and Interface Parameters, page 2-5
- Completing the Configuration, page 2-6
- Where to Go Next, page 2-7

If you prefer to configure the router manually or you wish to configure a module or interface that is not included in the setup command facility, proceed to "Chapter 3, "Configuring with the Command-Line Interface," for step-by-step instructions.

Before Starting Your Cisco VG224

Before you power on your Cisco VG224 and begin to use the setup command facility, make sure to follow these steps:

Step 1 Set up the hardware as described in the installation documents for your Cisco VG224.

Step 2 Configure your PC terminal emulation program for 9600 baud, 8 data bits, no parity, and 1 stop bit.

Step 3 Determine which network protocols you are supporting.

Step 4 Determine the addressing plan for each network protocol.

Using the setup Command

The setup command facility is displayed in your PC terminal emulation program window.

To create a basic configuration for your Cisco VG224, do the following:

- Complete the steps in "Configuring Global Parameters" section on page 2-2.
- Complete the steps in "Configuring Controller and Interface Parameters" section on page 2-5.
- Complete the steps in "Completing the Configuration" section on page 2-6.

✎
Note   If you make a mistake while using the setup command facility, you can exit and run the facility again. Press **Ctrl-C**, and type setup at the enable mode prompt (`Router#`).

Configuring Global Parameters

Step 1   Power on the Cisco VG224. The power switch is on the rear panel of the Cisco VG224, at the lower-right corner, near the power cord.

Messages begin to appear in your terminal emulation program window.

⚠
Caution   *Do not press any keys on the keyboard until the messages stop*. Any keys pressed during this time are interpreted as the first command typed when the messages stop, which might cause the Cisco VG224 to power off and start over. It takes a few minutes for the messages to stop.

The messages look similar to the following:

✎
Note   Much of the following example is largely for a Cisco VG224. The messages vary, depending on the Cisco IOS software release, interface modules in place in your Cisco VG224, and feature set you select. In addition, the word "Router" is the default prompt, and may appear elsewhere; interpret this word as meaning "Cisco VG224." The screen displays in this section are for reference only and might not exactly reflect the messages on your console.

```
System Bootstrap, Version 12.3(20030210:192652) [INT-mcebu_sb.wk.0.3.2 102], DEVELOPMENT
SOFTWARE
Copyright (c) 1986-2003 by cisco Systems, Inc.

FPGA readonly version:0015001C
FPGA upgrade version :001A001E
Upgrade FPGA currently running
cvg224 processor with 131072 Kbytes of main memory
Main memory is configured to 64 bit mode with parity disabled


Upgrade ROMMON initialized
rommon 1 > dir slot0:
program load complete, entry point:0x80008000, size:0xa0e0
Directory of slot0:

2      9711556   -rw-     vg224-i6s-mz-swell_2.0.4.1
9486   10051540  -rw-     vg224-i6s-mz.pi3_dhcp
rommon 2 > b slot0:vg224-i6s-mz-swell_2.0.4.1
```

```
program load complete, entry point:0x80008000, size:0xa0e0

program load complete, entry point:0x8001f000, size:0x942e80
Self decompressing the image
:################################################################################
######################### [OK]

Smart Init is enabled
smart init is sizing iomem
  ID          MEMORY_REQ             TYPE
00045B        0X004A528C 24 Analog FXS's, 2 FE
              0X000F3BB0 public buffer pools
              0X00211000 public particle pools
TOTAL:        0X007A9E3C

If any of the above Memory Requirements are
"UNKNOWN", you may be using an unsupported
configuration or there is a software problem and
system operation may be compromised.
Rounded IOMEM up to:8Mb.
Using 12 percent iomem. [8Mb/64Mb]

                Restricted Rights Legend

Use, duplication, or disclosure by the Government is
subject to restrictions as set forth in subparagraph
(c) of the Commercial Computer Software - Restricted
Rights clause at FAR sec. 52.227-19 and subparagraph
(c) (1) (ii) of the Rights in Technical Data and Computer
Software clause at DFARS sec. 252.227-7013.

            cisco Systems, Inc.
            170 West Tasman Drive
            San Jose, California 95134-1706

Cisco Internetwork Operating System Software
IOS (tm) vg224 Software (vg224-I6S-M), Version 12.3(swell_2.0.4.1), CISCO DEVELOPMENT TEST
VERSION
Copyright (c) 1986-2003 by cisco Systems, Inc.
Compiled Tue 15-Jul-03 00:31 by lcheungb
Image text-base:0x6001F8F4, data-base:0x61044000

cisco VG224 (R527x) processor (revision 3.0) with 57344K/8192K bytes of memory.
Processor board ID FHK0720U00G
R527x CPU at 225Mhz, Implementation 40, Rev 3.1
Bridging software.
1 On-Board Twenty-Four FXS Analog Voice Module
2 FastEthernet/IEEE 802.3 interface(s)
DRAM configuration is 64 bits wide with parity disabled.
63K bytes of non-volatile configuration memory.
System fpga version is 230024
System readonly fpga version is 20001E
Option for system fpga is 'system'.
31360K bytes of ATA Slot0 CompactFlash (Read/Write)

System is running with system fpga version 230024 (upgrade)
Option set for fpga is 'system'.

Press RETURN to get started!

        --- System Configuration Dialog ---
```

```
Would you like to enter the initial configuration dialog? [yes/no]: yes

At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '[]'.
```

Step 2 When the following message appears, enter **yes** to begin the initial configuration dialog:

```
Would you like to enter the initial configuration dialog? [yes/no]:
```

✎

Note If you answer **no** to this message, you are prompted to terminate AutoInstall. AutoInstall is a procedure that configures a new Cisco VG224 based on the configuration of an existing Cisco VG224.

    If you terminate AutoInstall, you enter the Cisco IOS software CLI.

✎

Note The number of interfaces shown depends on the Cisco VG224.

Step 3 When the following message appears, press **Return** to see the current interface summary:

```
First, would you like to see the current interface summary? [yes]:

Any interface listed with OK? value "NO" does not have a valid configuration

Interface      IP-Address      OK? Method Status        Protocol
FastEthernet0/0 unassigned     NO  unset  up            down
```

Step 4 Enter a host name for the Cisco VG224:

```
Configuring global parameters:

  Enter host name [Router]: VG224
```

```
The enable secret is a password used to protect access to privileged EXEC and
configuration modes. This password, after entered, becomes encrypted in the configuration.
```

Step 5 Enter an enable secret password. This password is encrypted (more secure) and cannot be seen when viewing the configuration.

```
    Enter enable secret: xxxx
```

```
The enable password is used when you do not specify an enable secret password, with some
older software versions, and some boot images.
```

Step 6 Enter an enable password that is different from the enable secret password. This password is *not* encrypted (less secure) and can be seen when viewing the configuration.

```
    Enter enable password: guessme
```

```
The virtual terminal password is used to protect access to the router over a network
interface.
```

Step 7 Enter the virtual terminal password, which prevents unauthenticated access to the router through ports other than the console port:

```
    Enter virtual terminal password: guessagain
```

Step 8 Respond to the following prompts as appropriate for your network:

```
Configure SNMP Network Management? [yes]:
```

```
        Community string [public]:
Configure LAT? [no]:
Configure IP? [yes]:
    Configure IGRP routing? [yes]:
      Your IGRP autonomous system number [1]: 1
```

> **Note**   If you answer **no** to IGRP, you are prompted to configure RIP.

```
Configure bridging? [no]:
```

Step 9   (Optional) Configure CHAP:

```
All users dialing in through the PRI will need to be
  authenticated using CHAP. The username and password are
  case sensitive.
  Do you want to enter username and passwords for PPP authentication ? [no]:
```

Step 10   Configure the ISDN switch type for PRI.

```
The following ISDN switch types are available:
        [0] none............If you do not want to configure ISDN
        [1] primary-4ess....AT&T 4ESS switch type for US and Canada
        [2] primary-5ess....AT&T 5ESS switch type for US and Canada
        [3] primary-dms100..Northern Telecom switch type for US and Canada
        [4] primary-net5....European switch type for NET5
        [5] primary-ni......National ISDN Switch type for the U.S
        [6] primary-ntt.....Japan switch type
        [7] primary-qsig....QSIG switch type
        [8] primary-ts014...Australian switch type
  Choose ISDN PRI Switch Type [2]:
```

> **Note**   BRI is not currently supported.

Configuring Controller and Interface Parameters

From this point on in the setup process, the prompts you see vary depending on the interface cards installed in your Cisco VG224. The following sections provide examples of the setup steps for card. Refer to the sections appropriate to your Cisco VG224.

Configuration examples include the following:

- Configuring Fast Ethernet and Serial Interface Parameters, page 2-5
- Configuring Fast Ethernet and Serial Interface Parameters, page 2-5

When you complete the setup steps for your interface modules, go to Completing the Configuration, page 2-6 for directions on saving your configuration.

Configuring Fast Ethernet and Serial Interface Parameters

This section illustrates the following:

- Fast Ethernet Interface Configuration

Fast Ethernet Interface Configuration

This section contains a sample configuration for the Fast Ethernet interface. Enter the values appropriate for your Cisco VG224 and network. The messages you see may vary.

```
Do you want to configure FastEthernet0/0 interface [yes]:
 Use the 100 Base-TX (RJ-45) connector? [yes]:
 Operate in full-duplex mode? [no]:
 Configure IP on this interface? [no]: yes
 IP address for this interface: 6.0.0.1
 Number of bits in subnet field [0]:
 Class A network is 6.0.0.0, 0 subnet bits, mask is /8
Configure IPX on this interface? [yes]:
    IPX network number [1]:
    Need to select encapsulation type
            [0] sap (IEEE 802.2)
            [1] snap (IEEE 802.2 SNAP)
            [2] arpa (Ethernet_II)
            [3] novell-ether (Novell Ethernet_802.3)
    Enter the encapsulation type [2]:
```

Completing the Configuration

When you have provided all the information prompted for by the setup command facility, the configuration appears.

Note For sample configurations, see Appendix A, "Cisco VG224 Configuration Example."

To complete your configuration, do the following:

Step 1 A setup command facility prompt asks if you want to save this configuration, with the following options:

```
[0] Go to the IOS command prompt without saving this config.
[1] Return back to the setup without saving this config.
[2] Save this configuration to nvram and exit.
```

If you answer **0**, the configuration information you entered is *not* saved, and you return to the Cisco VG224 enable prompt (`Router#`). Type **setup** to return to the System Configuration Dialog.

If you answer **1**, you return to setup without saving the configuration.

If you answer **2**, the configuration is saved and you are returned to the user EXEC prompt (`Router>`).

Step 2 When the messages stop appearing on your screen, press **Return** to get the `Router>` prompt.

Step 3 The `Router>` prompt indicates that you are now at the command-line interface (CLI) and you have just completed a basic Cisco VG224 configuration. However, this is *not* a complete configuration. At this point you have two choices:

- Run the setup command facility again and create another configuration. Enter the following:

```
Router> enable
Password: password
Router# setup
```

- Modify the existing configuration or configure additional features with the CLI as described in Chapter 3, "Configuring with the Command-Line Interface."

Where to Go Next

At this point you can proceed to the following:

- "Chapter 3, "Configuring with the Command-Line Interface," to learn how to use the CLI to configure additional features.

- The Cisco IOS software configuration guide and command reference publications for more advanced configuration topics. These publications are available on Cisco.com and the Documentation CD-ROM, or you can order printed copies. For more information, refer to "Obtaining Documentation" section on page x.

C H A P T E R **3**

Configuring with the Command-Line Interface

This chapter describes how to use the Cisco IOS software command-line interface (CLI) to configure basic Cisco VG224 functionality.

This chapter presents the following major topics:

Follow the procedures in this chapter to configure the Cisco VG224 manually or, if you want to, change the configuration after you have run the setup command facility (see "Using the setup Command" section on page 2-2).

This chapter does not describe every configuration possible—only a small portion of the most commonly used configuration procedures. For advanced configuration topics, refer to the Cisco IOS configuration guide and command reference publications. See "Obtaining Documentation" section on page x.

Note If you skipped the previous chapter, Chapter 2, "Using the setup Command," and you have never configured a Cisco VG224, go back to that chapter and read it now. The chapter contains important information you need to configure your Cisco VG224 successfully.

Configuring the Host Name and Password

One of the first configuration tasks you might want to do is to configure the host name and set an encrypted password. Configuring a host name allows you to distinguish multiple Cisco VG224s and routers from each other. Setting an encrypted password allows you to prevent unauthorized configuration changes.

	Command	Purpose
Step 1	`Router>` **`enable`** `Password:` *`password`* `Router#`	Enters enable mode. Enter the password. You have entered enable mode when the prompt changes to `Router#`.

Step 2	`Router#` **`configure terminal`**
	
	`Enter configuration commands, one per line. End with CNTL/Z.`
	
	`Router(config)#`
		Enters global configuration mode. You have entered global configuration mode when the prompt changes to `Router(config)#`.

Step 3	`Router(config)#` **`hostname VG224`** `Router(config)#`	Changes the name of the Cisco VG224 to a meaningful name. Substitute your host name for `Router`.
Step 4	`Router(config)#` **`enable secret guessme`**	Enters an enable secret password. This password provides access to privileged EXEC mode. When you enter **enable** at the user EXEC prompt (`Router>`), you must enter the enable secret password to gain access to configuration mode. Substitute your enable secret password for `guessme`.
Step 5	`Router(config)#` **`line con 0`**	Enters line configuration mode to configure the console port. When you enter line configuration mode, the prompt changes to `Router(config-line)#`.
	`Router(config-line)#` **`exec-timeout 0 0`**	Prevents the Cisco VG224's EXEC facility from timing out if you do not type any information on the console screen for an extended period.
	`Router(config-line)#` **`exit`** `Router(config)#`	Exits back to global configuration mode.

Verifying the Host Name and Password

To verify that you configured the correct host name and password:

Step 1 Enter the **show config** command:

```
Router(config)# show config

Using 1888 out of 126968 bytes
!
version XX.X
.
.
.
!
hostname VG224
!
enable secret 5 $1$60L4$X2JYOwoDc0.kqa1loO/w8/
.
.
.
```

Check the host name and encrypted password displayed near the top of the command output.

Step 2 Exit global configuration mode and attempt to reenter it using the new enable password:

```
Router# exit
.
.
.
Router con0 is now available
Press RETURN to get started.
Router> enable
Password: guessme
Router#
```

Tip If you are having trouble, ensure the following:

- **Caps Lock** is off.

- You entered the correct passwords. Passwords are case sensitive.

Configuring Fast Ethernet Interfaces

To configure a Fast Ethernet interface, use the configuration software provided with your Cisco VG224 or network module, if any. Otherwise, for greatest power and flexibility, use configuration mode (manual configuration).

> ✎
> **Note**   Before you begin, disconnect all WAN cables from the Cisco VG224 to keep it from trying to run the AutoInstall process. The Cisco VG224 tries to run AutoInstall whenever you power it on if there is a WAN connection on both ends and the Cisco VG224 does not have a valid configuration file stored in NVRAM (for instance, when you add a new interface). It can take several minutes for the Cisco VG224 to determine that AutoInstall is not connected to a remote TCP/IP host.

This section describes basic configuration, including enabling the interface and specifying IP routing. Depending on your own requirements and the protocols you plan to route, you might also need to enter other configuration commands.

Before you begin configuring the interfaces, make sure to do the following:

- Connect a console to the Cisco VG224.
- Power on the Cisco VG224.

	Command	Purpose
Step 1	`Router> `**`enable`** `Password: `*`password`* `Router#`	Enters enable mode. Enter the password. You have entered enable mode when the prompt changes to `Router#`.

Step 2	`Router# `**`configure terminal`**
	
	`Enter configuration commands, one per line.`
	`End with CNTL/Z.`
	
	`Router(config)#`
		Enters global configuration mode. You have entered global configuration mode when the prompt changes to `Router(config)#`.

Step 3	`Router# `**`ip routing`** `Router# `**`ipx routing`**	Enables routing protocols as required for your global configuration. This example uses IP routing and Internetwork Packet Exchange (IPX) routing.
Step 4	`Router(config)# `**`interface fastethernet 0/0`** `Router(config-if)#`	Enters interface configuration mode. You have entered interface configuration mode when the prompt changes to `Router(config-if)#`.
Step 5	`Router(config-if)# `**`ip address 172.16.74.3`** **`255.255.255.0`**	Assigns an IP address and subnet mask to the interface.
Step 6	`Router(config-if)# `**`ipx network B005`**	Configures routing protocols on the interface. You must have previously enabled these protocols as part of global configuration. In this example, IPX is being configured on the interface.

	Command	Purpose
Step 7	`Router(config-if)# exit`	Exits back to global configuration mode.
		Repeat Step 4 through Step 6 if your Cisco VG224 has more than one interface that you need to configure.

Step 8	`Router(config-if)# Ctrl-z`
	
	`Router#`
		When you finish configuring interfaces, returns to enable mode.

Saving Configuration Changes

To prevent the loss of the Cisco VG224 configuration, save it to NVRAM:

	Command	Purpose

Step 1	`Router> enable`
	
	`Password: password`
	
	`Router#`
		Enters enable mode. Enter the password.
		
		You have entered enable mode when the prompt changes to `Router#`.

Step 2	`Router# copy running-config startup-config`	Saves the configuration changes to NVRAM so that they are not lost during resets, power cycles, or power outages.

Step 3	`Router(config-if)# Ctrl-z`
	
	`Router#`
	
	`%SYS-5-CONFIG_I: Configured from console by console`
		Returns to enable mode.
		
		This message is normal and does not indicate an error.

Where to Go Next

At this point you can proceed to the following:

- The Cisco IOS software configuration guide and command reference publications for more advanced configuration topics. These publications are available on Cisco.com or on the Documentation CD-ROM, or you can order printed copies.

- *Cisco System Error Messages, Release 12.3(4)T,* and *Cisco Debug Command Reference, Release 12.3(4)T* provide troubleshooting information. For these and other documents, see Obtaining Documentation, page x.

Configuring Voice over IP

This chapter explains how to configure voice interfaces and ports, which convert telephone voice signals for transmission over an IP network.

This chapter presents the following major topics:

Voice over IP (VoIP) enables your Cisco VG224 to carry live voice traffic (for example, telephone calls and faxes) over an IP network. VoIP offers the following benefits:

- Unified voice and data trunking
- Plain old telephone service (POTS)-Internet telephony gateways

Prerequisites

Before you can configure your Cisco VG224 to use VoIP, you must first establish a working IP network.

Configuring the Voice Interface

Whenever you install a new interface, or if you want to change the configuration of an existing interface, you must configure the interface. If you replace a module that was already configured, the Cisco VG224 recognizes it and brings up the interface in the existing configuration.

Before you configure an interface, have the following information available:

- Protocols you plan to route on the new interface
- IP addresses, subnet masks, network numbers, zones, or other information related to the routing protocol

Timesaver   Obtain this information from your system administrator or network plan before you begin configuring your Cisco VG224.

To configure a voice interface, you must use configuration mode (manual configuration). In this mode, you can enter Cisco IOS commands through the command line interface (CLI).

To configure the voice interface configuration mode, follow this procedure:

Step 1   Connect a console to the Cisco VG224. If you need instructions for connecting a console, refer to the installation chapter of your Cisco VG224 installation and configuration guide.

Step 2   Power on the Cisco VG224. If the current configuration is no longer valid, after about one minute you see the following prompt:

```
Would you like to enter the initial dialog? [yes/no]:
```

Answer **no**. You now enter the normal operating mode of the Cisco VG224.

> ✎
> **Note**   If the current configuration is valid, you enter the normal operating mode automatically.

Step 3   After a few seconds, you see the user EXEC prompt (`Router>`). Type **enable** and the password to enter enable mode:

```
Router> enable
Password: <password>
```

Configuration changes can be made only in enable mode. The prompt changes to the privileged EXEC (enable) prompt (`Router#`):

```
Router#
```

Step 4   Enter the **configure terminal** command to enter configuration mode:

```
Router# configure terminal
Router(config)#
```

The Cisco VG224 enters global configuration mode, indicated by the `Router(config)#` prompt.

Step 5   If you have not configured the Cisco VG224 before, or want to change the configuration, use Cisco IOS commands to configure global parameters, passwords, network management, and routing protocols. In this example, IP routing is enabled:

```
Router(config)# ip routing
```

For complete information about global configuration commands, refer to the Cisco IOS configuration guides and command references.

Step 6   If you have not already done so, configure the network module or WAN interface card that you plan to use for IP traffic. For instructions, see your Cisco VG224's hardware installation and software configuration guides or the configuration note for the network module or WAN interface card.

Step 7   To configure another interface, enter the **exit** command to return to the `Router(config)#` prompt.

Step 8   To configure the Cisco VG224 for voice traffic, refer to the VoIP references in Prerequisites, page 4-1.

Step 9   When you finish configuring interfaces, exit configuration mode and return to the enable prompt by pressing **Ctrl-Z**. To see the current operating configuration, including any changes you just made, enter the **show running-config** command:

```
Router# show running-config
```

To see the configuration currently stored in NVRAM, enter the **show startup-config** command at the enable prompt:

```
Router# show startup-config
```

Step 10   The results of the **show running-config** and **show startup-config** commands differ from each other if you have made changes to the configuration, but have not yet written them to NVRAM. To write your changes to NVRAM, making them permanent, enter the **copy running-config startup-config** command at the enable prompt:

```
Router# copy running-config startup-config
Building configuration. . .
[OK]
Router#
```

The Cisco VG224 is now configured to boot in the new configuration.

Where to Go Next

For further information on VoIP configuration procedures and debug commands, refer to the following:

- *Cisco IOS Voice Configuration Library*.

A P P E N D I X **A**

Cisco VG224 Configuration Example

This appendix presents the following sample configurations for the Cisco VG224.

```
Current configuration : 2612 bytes
!
version 12.3(4)T
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname swell-China
!
!
ip subnet-zero
!
!
!
!
!
!
!
!
!
!
no voice hpi capture buffer
no voice hpi capture destination
!
!
mta receive maximum-recipients 0
!
!
!
!
!
!
interface FastEthernet0/0
 ip address 1.3.21.55 255.255.0.0
 ip nat inside
 duplex auto
 speed auto
!
interface FastEthernet0/1
 ip address 1.2.111.1 255.255.0.0
 duplex auto
 speed auto
!
ip http server
```

```
no ip http secure-server
ip classless
ip route 0.0.0.0 0.0.0.0 1.2.0.1
!
!
!
!
!
call rsvp-sync
!
voice-port 2/0
 disc_pi_off
 input gain 10
 output attenuation 10
 playout-delay minimum low
 cptone HK
 timing digit 53
 description cflow1
 music-threshold -50
 bearer-cap Speech
 station-id name ashwin
 station-id number 1000
 caller-id enable
 ren 3
 disconnect-ack
 loss-plan plan4
 idle-voltage high
!
voice-port 2/1
 disc_pi_off
 input gain 10
 output attenuation 10
 playout-delay minimum low
 cptone HK
 timing digit 53
 description cflow1
 music-threshold -50
 bearer-cap Speech
 station-id name ashwin
 station-id number 1000
 caller-id enable
 ren 3
 disconnect-ack
 loss-plan plan4
 idle-voltage high
!
voice-port 2/2
 cptone HK
!
voice-port 2/3
 cptone HK
!
voice-port 2/4
 cptone HK
!
voice-port 2/5
 cptone HK
!
voice-port 2/6
 cptone HK
!
voice-port 2/7
 cptone HK
!
```

```
voice-port 2/8
 cptone HK
!
voice-port 2/9
 cptone HK
!
voice-port 2/10
 cptone HK
!
voice-port 2/11
!
voice-port 2/12
!
voice-port 2/13
!
voice-port 2/14
!
voice-port 2/15
!
voice-port 2/16
!
voice-port 2/17
!
voice-port 2/18
!
voice-port 2/19
!
voice-port 2/20
!
voice-port 2/21
!
voice-port 2/22
!
voice-port 2/23
!
!
mgcp profile default
!
dial-peer cor custom
!
!
!
dial-peer voice 1 pots
 service stcapp 1000
 port 2/0
!
dial-peer voice 2 pots
 service stcapp 2000
 port 2/1
!
dial-peer voice 3 pots
 service stcapp 1002
 port 2/2
!
dial-peer voice 4 pots
 service stcapp 1003
 port 2/3
!
dial-peer voice 5 pots
 service stcapp 1004
 port 2/4
!
dial-peer voice 6 pots
 service stcapp 1005
```

```
 port 2/5
!
dial-peer voice 10 voip
 destination-pattern 2...
 session target ipv4:1.2.125.57
 codec g711ulaw
!
dial-peer voice 7 pots
 service stcapp 1006
 port 2/6
!
dial-peer voice 8 pots
 service stcapp 1007
 port 2/7
!
dial-peer voice 9 pots
 service stcapp 1008
 port 2/8
!
dial-peer voice 11 pots
 service stcapp 1009
 port 2/9
!
dial-peer voice 12 pots
 service stcapp 1010
 port 2/10
!
!
!
line con 0
 exec-timeout 0 0
 speed 115200
line aux 0
line vty 0 4
 login
!
end
```

Formatting the Compact Flash Memory Cards

This appendix describes how to format the compact flash memory into a Class B flash file system, known as the low-end file system (LEFS), or into a Class C flash file system, which is similar to the standard DOS file system. It also describes how to perform file and directory operations in each file system.

This appendix presents the following major topics:

Formatting Procedures for Compact Flash Memory Cards

The following sections describe formatting procedures for internal and external compact flash memory cards.

Formatting Procedures

We recommend that you erase (Class B) or format (Class C) new compact flash memory cards to initialize them with either a Class B or Class C flash file system. This ensures proper formatting and enables the ROM monitor to recognize and boot the flash.

Note   A compact flash memory card formatted with the standard DOS file system does not support booting from the ROM monitor.

Determining the File System on a Compact Flash Memory Card

To determine the file system of an external compact flash memory card, enter the **show slot0: all** command. To determine the file system of an internal compact flash memory card, enter the **show flash: all** command.

- If geometry and format information is not displayed, the card is formatted with a Class B flash file system.
- If geometry and format information is displayed, the card is formatted with a Class C flash file system.

The following examples show sample outputs for Class B and Class C flash file systems:

External Card with Class B Flash File System

The geometry and format information is not displayed for this format:

```
Router# show slot0: all

Partition   Size     Used      Free      Bank-Size  State        Copy
Mode
  1        31360K   6502K     24857K       0K       Read/Write   Direct

Slot0 CompactFlash directory:
File  Length   Name/status
        addr      fcksum  ccksum
  1  6658376  cvg224-i-mz
        0x40     0xE0FF  0xE0FF
[6658440 bytes used, 25454200 available, 32112640 total]
31360K bytes of ATA Slot0 CompactFlash (Read/Write)

 Chip information NOT available.
```

External Card with Class C Flash File System

The geometry and format information is displayed in this forma:

```
Router# show slot0: all

-#- --length-- -----date/time------ path
1      6658376 Mar 01 1993 04:27:46 cvg224-i-mz

25268224 bytes available (6664192 bytes used)

******** ATA Flash Card Geometry/Format Info ********

ATA CARD GEOMETRY
   Number of Heads:      4
   Number of Cylinders   490
   Sectors per Cylinder  32
   Sector Size           512
   Total Sectors         62720

ATA CARD FORMAT
   Number of FAT Sectors  31
   Sectors Per Cluster    8
   Number of Clusters     7796
   Number of Data Sectors 62560
   Base Root Sector       155
   Base FAT Sector        93
   Base Data Sector       187
```

Internal Card with Class B Flash File System

The geometry and format information is not displayed for this format:

```
Router# show flash: all

Partition   Size     Used      Free      Bank-Size  State        Copy
Mode
  1        125184K  20390K    104793K      0K       Read/Write
Direct
```

```
System CompactFlash directory:
File  Length   Name/status
        addr      fcksum  ccksum
  1   6658376  cvg224-i-mz
        0x40      0xE0FF  0xE0FF
  2   14221136  cvg224-telcoent-mz
        0x6599C8  0x5C3D  0x5C3D
[20879640 bytes used, 107308776 available, 128188416 total]
125184K bytes of ATA System CompactFlash (Read/Write)

 Chip information NOT available.
```

Internal Card with Class C Flash File System

The geometry and format information is displayed in this format:

```
11# show flash: all

-#- --length-- -----date/time------ path
1      6658376 Mar 01 1993 04:27:46 cvg224-i-mz

25268224 bytes available (6664192 bytes used)

******** ATA Flash Card Geometry/Format Info ********

ATA CARD GEOMETRY
   Number of Heads:       4
   Number of Cylinders    490
   Sectors per Cylinder   32
   Sector Size            512
   Total Sectors          62720

ATA CARD FORMAT
   Number of FAT Sectors  31
   Sectors Per Cluster    8
   Number of Clusters     7796
   Number of Data Sectors 62560
   Base Root Sector       155
   Base FAT Sector        93
   Base Data Sector       187
```

Formatting Compact Flash Memory as a Class B Flash File System

Use these formatting commands to:

- Format compact flash memory cards with a Class B flash file system (LEFS)
- Remove the files from a compact flash memory card previously formatted with a Class B flash file system

For external compact flash memory cards, enter the **erase slot0:** command.

For internal compact flash memory cards, enter the **erase flash:** command.

The following example shows sample output for formatting an external compact flash memory card with a Class B flash file system:

```
Router# erase slot0:

Erasing the slot0 filesystem will remove all files! Continue? [confirm]
Current DOS File System flash card in slot0: will be formatted into Low
End File System flash card!  Continue? [confirm]
Erasing device...
```

Cisco VG224 Voice Gateway Software Configuration Guide

```
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
...erased
Erase of slot0: complete
```

Formatting Compact Flash Memory as a Class C File System

Use these formatting commands to do the following:

- Format compact flash memory cards with a Class C flash file system
- Remove the files from a compact flash memory card previously formatted with a Class C flash file system

For external compact flash memory cards, enter the **format slot0:** command.

For internal compact flash memory cards, enter the **format flash:** command.

The following example shows sample output for formatting an internal compact flash memory card with a Class C flash file system:

```
Router# format flash:

Format operation may take a while. Continue? [confirm]
Format operation will destroy all data in "flash:".  Continue? [confirm]
Enter volume ID (up to 64 chars)[default flash]:
Current Low End File System flash card in flash will be formatted into DOS
File System flash card!  Continue? [confirm]
Format:Drive communication & 1st Sector Write OK...
Writing Monlib sectors .................................................................
Monlib write complete
..
Format:All system sectors written. OK...

Format:Total sectors in formatted partition:250592
Format:Total bytes in formatted partition:128303104
Format:Operation completed successfully.

Format of flash complete
```

File and Directory Operations

The following sections describe file and directory operations for internal and external Cisco flash memory cards. File and directory operations vary according to the formatted file system—Class B or Class C.

Operations for Use with Class B Flash File System

The following file operations are useful for compact flash memory cards formatted with a Class B flash file system.

Copying Files

To copy files to another location, enter the **copy** {**flash:** | **slot0:**} command.

The following example shows sample output for copying a Cisco IOS file from an internal compact flash memory card (**flash:**) to an external compact flash memory card (**slot0:**):

```
Router# copy flash:cvg224-i-mz.tmp slot0:

Destination filename [cvg224-i-mz.tmp]?
Erase slot0:before copying?
[confirm]nCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
Verifying checksum...  OK (0xC68E)
6458584 bytes copied in 67.788 secs (96396 bytes/sec)
```

The following example shows sample output for copying a configuration file to the startup configuration in an internal compact flash memory card (**flash:**):

```
Router# copy flash:my-config1 startup-config

Destination filename [startup-config]?
[OK]
517 bytes copied in 4.188 secs (129 bytes/sec)
```

The following example shows sample output for copying a configuration file to the running configuration in an internal compact flash memory card (**flash:**):

```
Router# copy flash:my-config2 running-config

Destination filename [running-config]?
709 bytes copied in 0.72 secs
```

Displaying the Contents of a Compact Flash Memory Card

To display the contents (directories and files) of a compact flash memory card formatted with a Class B flash file system, enter the **dir** {**flash:** | **slot0:**} command or the **show** {**flash:** | **slot0:**} command.

The following example shows sample output for displaying the contents of an internal compact flash memory card using the **dir flash:** command:

```
Router# dir flash:

Directory of flash:/

    1  -rw-     5190020               <no date>  cvg224-i-mz
    2  -rw-     6458584               <no date>  cvg224-i-mz
    3  -rw-    16535740               <no date>  cvg224-telcoent-mz

128450560 bytes total (100266024 bytes free)
```

The following example shows sample output for displaying the contents of an external compact flash memory card using the **show slot0:** command:

```
Router# show slot0:

System CompactFlash directory:
File  Length   Name/status
   1   5190020  cvg224-i-mz
   2   6458584  cvg224-i-mz
   3  16535740  cvg224-telcoent-mz
[28184536 bytes used, 100266024 available, 128450560 total]
125440K bytes of ATA System CompactFlash (Read/Write)
```

Delete Files from Compact Flash Memory

To delete a file from compact flash memory, enter the **delete** {**flash:** | **slot0:**} command, followed by the **squeeze** {**flash:** | **slot0:**} command.

When a file is deleted in the Class B flash file system, the memory space occupied by the deleted file is not released until you enter the **squeeze** {**flash:** | **slot0:**} command. Although the memory space once occupied by the deleted file remains, the deleted file cannot be recovered. To release the memory space occupied by a deleted file, enter the **squeeze** {**flash:** | **slot0:**} command.

Note The **dir** {**flash:** | **slot0:**} command does not show deleted files; the **show** {**flash:** | **slot0:**} command shows all files, including any deleted files if the **squeeze** {**flash:** | **slot0:**} command has not been entered.

The following example shows sample output for deleting a Cisco IOS file from an external compact flash memory card, and then releasing the memory space originally occupied by the file:

```
Router# dir slot0:

Directory of slot0:/

    1  -rw-     6458208              <no date>  cvg224-i-mz.tmp
    2  -rw-     6458208              <no date>  cvg224-i-mz

16056320 bytes total (3139776 bytes free)

Router# delete slot0:cvg224-i-mz.tmp

Delete filename [cvg224-i-mz.tmp]?
Delete slot0:cvg224-i-mz.tmp? [confirm]

Router# dir slot0:

Directory of slot0:/

    2  -rw-     6458208              <no date>  cvg224-i-mz

16056320 bytes total (3139776 bytes free)

Router# show slot0:

Slot0 CompactFlash directory:
File  Length   Name/status
   1  6458208  cvg224-i-mz.tmp [deleted]
   2  6458208  cvg224-i-mz
[12916544 bytes used, 3139776 available, 16056320 total]
15680K bytes of ATA Slot0 CompactFlash (Read/Write)

Router# squeeze slot0:
```

```
Squeeze operation may take a while. Continue? [confirm]
squeeze in progress...
ssssssssssssssssssssssseeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
Rebuild file system directory...
Squeeze of slot0 complete
```

Displaying File Content

To display the content of a file in compact flash memory, use the **more** {**flash:** | **slot0:**} command.

The following example shows sample output from the **more** {**flash:** | **slot0:**} command on an external Cisco flash memory card:

```
Router# more slot0:cvg224-i-mz

00000000: 7F454C46 01020100 00000000 00000000    .ELF .... .... ....
00000010: 00020061 00000001 80008000 00000034    ...a .... .... ...4
00000020: 00000054 20000001 00340020 00010028    ...T  ... .4.  ...(
00000030: 00050008 00000001 0000011C 80008000    .... .... .... ....
00000040: 80008000 00628A44 00650EEC 00000007    .... .b.D .e.l ....
00000050: 0000011C 0000001B 00000001 00000006    .... .... .... ....
00000060: 80008000 0000011C 00004000 00000000    .... .... ..@. ....
00000070: 00000000 00000008 00000000 00000021    .... .... .... ...!
00000080: 00000001 00000002 8000C000 0000411C    .... .... ..@. ..A.
00000090: 00000700 00000000 00000000 00000004    .... .... .... ....
000000A0: 00000000 00000029 00000001 00000003    .... ...) .... ....
000000B0: 8000C700 0000481C 00000380 00000000    ..G. ..H. .... ....
000000C0: 00000000 00000004 00000000 0000002F    .... .... .... .../
000000D0: 00000001 10000003 8000CA80 00004B9C    .... .... ..J. ..K.
000000E0: 00000020 00000000 00000000 00000008    ...  .... .... ....
000000F0: 00000000 0000002F 00000001 10000003    .... .../ .... ....
00000100: 8000CAA0 00004BBC 00623FA4 00000000    ..J  ..K< .b?$ ....
00000110: 00000000 00000008 00000000 3C1C8001    .... .... .... <...
00000120: 679C4A80 3C018001 AC3DC70C 3C018001    g.J. <... ,=G. <...
00000130: AC3FC710 3C018001 AC24C714 3C018001    ,?G. <... ,$G. <...
00000140: AC25C718 3C018001 AC26C71C 3C018001    ,%G. <... ,&G. <...
00000150: AC27C720 3C018001 AC30C724 3C018001    ,'G  <... ,0G$ <...
00000160: AC31C728 3C018001 AC32C72C 3C018001    ,1G( <... ,2G, <...
--More-- q
```

Operations for Use with Class C Flash File System

The following file and directory operations are useful for compact flash memory cards formatted with a Class C flash file system.

File Operations for Class C Flash File System

Copying Files

To copy files to another location, enter the **copy** {**flash:** | **slot0:**} command.

The following example shows sample output for copying a Cisco IOS file from an external compact flash memory card to an internal compact flash memory card:

```
Router# copy slot0:cvg224-i-mz.tmp flash:

Destination filename [cvg224-i-mz.tmp]?
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
```

```
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
CCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCCC
6458584 bytes copied in 202.940 secs (31973 bytes/sec)
```

The following example shows sample output for copying a configuration file to the startup configuration in an internal compact flash memory card (`flash:`):

```
Router# copy flash:my-config1 startup-config

Destination filename [startup-config]?
[OK]
517 bytes copied in 4.188 secs (129 bytes/sec)
```

The following example shows sample output for copying a configuration file to the running configuration in an internal compact flash memory card (`flash:`):

```
Router# copy flash:my-config2 running-config

Destination filename [running-config]?
709 bytes copied in 0.72 secs
```

Displaying the Contents of a Compact Flash Memory Card

To display the contents (directories and files) of a compact flash memory card formatted with a Class C flash file system, use the **dir**{**flash:** | **slot0:**} or **show** {**flash:** | **slot0:**} command.

The following examples show sample outputs for displaying the contents of an external compact flash memory card with a Class C flash file system:

```
Router# show slot0:

-#- --length-- -----date/time------ path
1     6658376 Mar 01 1993 00:29:52 cvg224-i-mz
2        2124 Mar 01 1993 00:34:38 running-config
3        2622 Mar 01 1993 00:34:44 startup-config

25260032 bytes available (6672384 bytes used)

Router# dir slot0:

Directory of slot0:/

   3  -rw-     6455048   Mar 01 2001 00:04:06  cvg224-i-mz
1579  -rw-     6458584   Mar 01 2001 00:24:38  cvg224-i-mz.new

15912960 bytes total (2998272 bytes free)
```

Displaying Geometry and Format Information

To display the geometry and format information of a compact flash memory card formatted with a Class C flash file system, use the **show** {**flash:** | **slot0:**} **filesys** command.

The following example shows sample output for displaying the geometry and format information of an external Cisco flash memory card:

```
Router# show slot0: filesys
```

```
******** ATA Flash Card Geometry/Format Info ********

ATA CARD GEOMETRY
   Number of Heads:       4
   Number of Cylinders    490
   Sectors per Cylinder   32
   Sector Size            512
   Total Sectors          62720

ATA CARD FORMAT
   Number of FAT Sectors  31
   Sectors Per Cluster    8
   Number of Clusters     7796
   Number of Data Sectors 62560
   Base Root Sector       155
   Base FAT Sector        93
   Base Data Sector       187
```

Delete Files from Compact Flash Memory

To delete a file from a compact flash memory card, use the **delete** {**flash:** | **slot0:**} command.

The following example shows sample output for deleting a Cisco IOS file from an internal compact flash memory card:

```
Router# delete flash:cvg224-i-mz.tmp

Delete filename [cvg224-i-mz.tmp]?
Delete flash:cvg224-i-mz.tmp? [confirm]

Router# dir flash:

Directory of flash:/

No files in directory

128094208 bytes total (128094208 bytes free)
```

Rename a File

To rename a file in a compact flash memory card, use the **rename** {**flash:** | **slot0:**} command.

The following example shows sample output for renaming a Cisco IOS file in an internal compact flash memory card:

```
Router# dir flash:

Directory of flash:/

   3  -rw-     6458388   Mar 01 1993 00:00:58  cvg224-i-mz.tmp
1580  -rw-     6462268   Mar 06 1993 06:14:02  cvg224-i-mz.VG224ata

63930368 bytes total (51007488 bytes free)

Router# rename flash:cvg224-i-mz.tmp flash:cvg224-i-mz

Destination filename [cvg224-i-mz]?

Router# dir flash:

Directory of flash:/

1580  -rw-     6462268   Mar 06 1993 06:14:02  cvg224-i-mz.VG224ata
   3  -rw-     6458388   Mar 01 1993 00:01:24  cvg224-i-mz
```

```
63930368 bytes total (51007488 bytes free)
```

Displaying File Content

To display the content of a file in a compact flash memory card, use the **more** {**flash:** | **slot0:**} command.

The following example shows sample output from the **more** {**flash:** | **slot0:**} command on an internal compact flash card:

```
Router# more flash:cvg224-i-mz.tmp

00000000: 7F454C46 01020100 00000000 00000000   .ELF .... .... ....
00000010: 00020061 00000001 80008000 00000034   ...a .... .... ...4
00000020: 00000054 20000001 00340020 00010028   ...T ... .4.  ...(
00000030: 00050008 00000001 0000011C 80008000   .... .... .... ....
00000040: 80008000 00628A44 00650EEC 00000007   .... .b.D .e.1 ....
00000050: 0000011C 0000001B 00000001 00000006   .... .... .... ....
00000060: 80008000 0000011C 00004000 00000000   .... .... ..@. ....
00000070: 00000000 00000008 00000000 00000021   .... .... .... ...!
00000080: 00000001 00000002 8000C000 0000411C   .... .... ..@. ..A.
00000090: 00000700 00000000 00000000 00000004   .... .... .... ....
000000A0: 00000000 00000029 00000001 00000003   .... ...) .... ....
000000B0: 8000C700 0000481C 00000380 00000000   ..G. ..H. .... ....
000000C0: 00000000 00000004 00000000 0000002F   .... .... .... .../
000000D0: 00000001 10000003 8000CA80 00004B9C   .... .... ..J. ..K.
000000E0: 00000020 00000000 00000000 00000008   ... .... .... ....
000000F0: 00000000 0000002F 00000001 10000003   .... .../ .... ....
00000100: 8000CAA0 00004BBC 00623FA4 00000000   ..J  ..K< .b?$ ....
00000110: 00000000 00000008 00000000 3C1C8001   .... .... .... <...
00000120: 679C4A80 3C018001 AC3DC70C 3C018001   g.J. <... ,=G. <...
00000130: AC3FC710 3C018001 AC24C714 3C018001   ,?G. <... ,$G. <...
00000140: AC25C718 3C018001 AC26C71C 3C018001   ,%G. <... ,&G. <...
00000150: AC27C720 3C018001 AC30C724 3C018001   ,'G  <... ,0G$ <...
00000160: AC31C728 3C018001 AC32C72C 3C018001   ,1G( <... ,2G, <...
--More-- q
```

Directory Operations for Class C Flash File System

Create a New Directory

To create a directory in compact flash memory, use the **mkdir** {**flash:** | **slot0:**} command.

The following example shows sample output for first displaying the contents of an internal compact flash card, and then creating a directory named **config** and a subdirectory named **test-config**:

```
Router# dir flash:

Directory of flash:/

  3  -rw-     6458208   Mar 01 1993 00:04:08  cvg224-i-mz.tmp

128094208 bytes total (121634816 bytes free)

Router# mkdir flash:/config

Create directory filename [config]?
Created dir flash:/config

Router# mkdir flash:/config/test-config
```

```
Create directory filename [/config/test-config]?
Created dir flash:/config/test-config

Router# dir flash:

Directory of flash:/

   3  -rw-     6458208   Mar 01 1993 00:04:08  cvg224-i-mz.tmp
 1580  drw-          0   Mar 01 1993 23:48:36  config

128094208 bytes total (121626624 bytes free)

Router# cd flash:/config

Router# dir flash:

Directory of flash:/config/

 1581  drw-          0   Mar 01 1993 23:50:08   test-config

128094208 bytes total (121626624 bytes free)
```

Remove a Directory

To remove a directory from compact flash memory, use the **rmdir** {**flash:** | **slot0:**} command.

Before you can remove a directory, all files and subdirectories must be removed from the directory.

The following example shows sample output for displaying the contents of an internal compact flash card, then removing the subdirectory named **test-config**:

```
Router# dir flash:

Directory of flash:/config/

 1581  drw-          0   Mar 01 1993 23:50:08   test-config

128094208 bytes total (121626624 bytes free)

Router# rmdir flash:/config/test-config

Remove directory filename [/config/test-config]?
Delete flash:/config/test-config? [confirm]
Removed dir flash:/config/test-config

Router# dir flash:

Directory of flash:/config/

No files in directory

128094208 bytes total (121630720 bytes free)
```

Enter a Directory and Determine Which Directory You Are In

To enter a directory in compact flash memory, use the **cd** command.

To determine which directory you are in, use the **pwd** command.

If you enter only **cd**, you go to the default home directory, which is **flash:/**.

The following example shows sample output, respectively, for the following actions:

- Entering the home directory of a compact flash memory card in an internal slot (**flash:/**)
- Verifying that you are in the home directory

- Displaying the contents of the home directory

- Entering the **/config** directory

- Verifying that you are in the **/config** directory

- Entering the home directory of a compact flash memory card in an external slot (**slot0:/**)

- Verifying that you are in the **slot0:/** directory

- Returning to the home directory (**flash:/**)

- Verifying that you are in the home directory

```
Router# cd

Router# pwd

flash:

Router# dir

Directory of flash:/

    3  -rw-     6458208   Mar 01 1993 00:04:08  cvg224-i-mz.tmp
 1580  drw-           0   Mar 01 1993 23:48:36  config

128094208 bytes total (121630720 bytes free)

Router# cd config

Router# pwd

flash:/config/

Router# cd slot0:

Router# pwd

slot0:/

Router# cd

Router# pwd

flash:
```

Using the ROM Monitor

This appendix describes the ROM monitor (also called the bootstrap program), which is the firmware that runs when you power on or restart the Cisco VG224 voice gateway. During normal operation, the ROM monitor helps to initialize the processor hardware and boot the operating system software. You can also use the ROM monitor to help you isolate or rule out hardware problems encountered when installing your router.

This appendix contains the following sections:

Entering the ROM Monitor Mode

To use the ROM monitor, you must have access to the console port.

Note For information on connecting the console cable, refer to *Quick Start Guide Cisco 2610 Router Cabling and Setup* at the following URL:
http://www.cisco.com/univercd/cc/td/doc/product/access/acs_mod/cis2600/hw_inst/cabling/2610ja.htm

To enter the ROM monitor mode, do the following:

Configuring

	Command or Action	Purpose
Step 1	Router> **reload**	Restarts the Cisco VG224.
Step 2	Press the **Break** key during the first 60 seconds while the system is starting up.	Forces the router to stop booting and enter the ROM monitor mode.

Verifying

To verify that you are in ROM monitor mode, check that the prompt displayed on your screen is the ROM monitor mode prompt:

```
rommon # >
```

The # is the line number and increases incrementally at each prompt.

Tip   From the Cisco IOS software, you can configure the router to automatically enter the ROM monitor mode the next time the router boots by setting virtual configuration register bits 3, 2, 1, and 0 to zero. From the console, enter the following configuration command:

```
configuration-register 0x0
```

The new configuration register value, 0x0, is effective after the router is rebooted with the **reload** command. The router remains in ROM monitor and does not boot the operating system.

As long as the configuration register value remains 0x0, you must manually boot the operating system from the console. Refer to the **boot** command in the section "Command Descriptions" later in this appendix.

ROM Monitor Commands

Enter **?** or **help** at the ROM monitor mode prompt to display a list of available commands. For example:

```
rommon 1 > ?
alias      set and display aliases command
boot       boot up an external process
break      set/show/clear the breakpoint
confreg    configuration register utility
cont       continue executing a downloaded image
context    display the context of a loaded image
cookie     display contents of cookie PROM in hex
dev        list the device table
dir        list files in the file system
dis        display instruction stream
dnld       serial download a program module
frame      print out a selected stack frame
fpga-pref  select an FPGA
help       monitor builtin command help
history    monitor command history
meminfo    main memory information
repeat     repeat a monitor command
```

```
reset       system reset
set         display the monitor variables
showcookie  display cookie information
showfpga    display the current selected FPGA
stack       produce a stack trace
sync        write monitor environment to NVRAM
sysret      print out info from last system return
tftpdnld    tftp image download
unalias     unset an alias
unset       unset a monitor variable
xmodem      x/ymodem image download
rommon 2 >
```

Note   You can abort any command by pressing the Break key at the console.

ROM Monitor Syntax Conventions

The ROM monitor syntax in this appendix uses the following conventions:

- Square brackets [ ] denote an optional element. In the following example, the element abc is not required, but you can specify it if you choose:

command [abc]

- If a minus option is followed by a colon (for example, [-s:]) you must provide an argument for the option.

- A term in italics means that you must fill in the appropriate information. In the following example, you replace the term in italics with the interface type you are using:

command *type interface*

Command Descriptions

This section lists some useful ROM monitor commands. Refer to the Cisco IOS configuration guides and command references for more information on ROM monitor commands.

boot or **b**—Boot an image.

- Boots the first image in flash memory.

- *flash:/slot0* [*name*] boots the Cisco IOS software from flash memory.

Note   The above command is not available on the Cisco VG224.

- *filename tftpserver* boots from the specified file over the network from the specified TFTP server. For example:

```
boot cvg224-i-mz 172.15.19.11
```

- *filename* boots from the boothelper image because it does not recognize the device ID. This form of the command is used to netboot the image named *filename*.

- The Cisco VG224 does not have a dedicated boothelper image ([rx]boot) as used by some other Cisco routers. With the Cisco VG224, the first image in flash memory is invoked as the default boothelper image anytime the ROM monitor does not recognize the device ID in the **boot** command.

- You can override the default boothelper image setting by setting the BOOTLDR Monitor environment variable to point to another image. Any system image can be used for this purpose.

- Options to the boot command are **-x**, load image but do not execute, and **-v**, verbose.

- Use the Cisco IOS commands **show version** and **show hardware** to display the source of the currently running image.

  - **dir** *device:*[*partition:*]—List the files on the named device. For example:

    ```
    rommon 8 > dir flash: /dir slot0:

          File size            Checksum    File name
        2229799 bytes (0x220627)   0x469e    CVG224-j-m2.113-4T
    ```

  - **help**—Display a summary of ROM monitor commands (equivalent to **?**).

  - **meminfo**—Display size in bytes, starting address, available range of main memory, the starting point and size of packet memory, and size of nonvolatile memory (NVRAM). The following example shows the **meminfo** command:

    ```
    rommon 9 > meminfo


    -------------------------------------------------
    Current Memory configuration is:
    Dimm0: Size = 128 MB : Start Addr = 0x00000000
    -----Bank 0 128 MB
    -----Bank 1   0 MB
    Dimm1: Not Installed
    -------------------------------------------------
    Main memory size: 128 MB in 64 bit mode.
    Available main memory starts at 0xa000e000, size 131016KB
    IO (packet) memory size: 0 percent of main memory.
    NVRAM size: 88KB
    ```

- **meminfo [-l]**—The **meminfo** command with the **-l** option displays supported DRAM configurations. The following example is a sample of the **meminfo -l** command output:

  ```
  rommon 10 > meminfo -l

  The following 64 bit memory configs are supported:
  -------------------------------------------------
  DIMM SOCKET 0            DIMM SOCKET 1            TOTAL MEMORY
  Bank 0   Bank1           Bank 0 Bank 1
  -------------           -------------            ------------
    0 MB   0 MB             32 MB    0 MB            32 MB
    0 MB   0 MB             64 MB    0 MB            64 MB
    0 MB   0 MB            128 MB    0 MB           128 MB
    0 MB   0 MB            256 MB    0 MB           256 MB
   32 MB   0 MB              0 MB    0 MB            32 MB
   32 MB   0 MB             32 MB    0 MB            64 MB
   32 MB   0 MB             64 MB    0 MB            96 MB
   32 MB   0 MB            128 MB    0 MB           160 MB
   64 MB   0 MB              0 MB    0 MB            64 MB
   64 MB   0 MB             32 MB    0 MB            96 MB
   64 MB   0 MB             64 MB    0 MB           128 MB
   64 MB   0 MB            128 MB    0 MB           192 MB
  128 MB   0 MB              0 MB    0 MB           128 MB
  128 MB   0 MB             32 MB    0 MB           160 MB
  128 MB   0 MB             64 MB    0 MB           192 MB
  128 MB   0 MB            128 MB    0 MB           256 MB
  ```

- **showfpga**—Show FPGA-related information.

- **reset** or **i**—Reset and initialize the router, similar to power-on.

- **tftpdnld**—Download an image using Trivial File Transfer Protocol (TFTP) from a remote server.

- **show rom-monitor**—Shows version of read-only ROMMON, and if present, the upgrade version of ROMMON. It also shows the current version of ROMMON, which version will be selected for execution when the Cisco IOS software is booted again. This command is available in the Cisco IOS EXEC mode.

    - **showmon**—Available in the ROMMON command mode. Provides the same information as the **show rom-monitor** command in the Cisco IOS EXEC mode.

- **upgrade rom-monitor** *[file<URL>|preference[readonly|upgrade]]*—Installs and reloads a new version of ROMMON in the Cisco IOS exec mode. URL refers to the path where the new ROMMON image is stored. Prompts the user to save the configuration.

    - **upgrade rom-monitor preference** *[readonly|upgrade]*—Selects the version of ROMMON to be loaded the next time the router is reloaded. This command is used in the Cisco IOS EXEC mode.

    - **rommon-pref**—Used in ROMMON command mode. Provides the same information as **upgrade rom-monitor preference** command in the Cisco IOS EXEC mode.

    - **fpga-pref** [*readonly|system*]—Field Programmable Gate-Array (FPGA), used in ROMMON command mode. Selects which FPGA to run.

Debugging Commands

Most debugging commands are functional only when Cisco IOS software has crashed or is aborted. If you enter a debugging command and Cisco IOS crash information is not available, the following error message appears:

```
"xxx: kernel context state is invalid, can not proceed."
```

- **stack** or **k**—Produces a stack trace.

- **context**—Displays processor context.

- **frame**—Displays an individual stack frame.

- **sysret**—Displays return information from the last booted system image. This information includes the reason for terminating the image, a stack dump of up to eight frames, and, if an exception is involved, the address where the exception occurred. For example:

```
rommon 8 > sysret

System Return Info:
count: 19,  reason: a SegV exception
pc:0x802b1040,  error address: 0x802b1040
Stack Trace:
FP: 0x80908398, PC: 0x802b102c
FP: 0x809083b0, PC: 0x802b0b88
FP: 0x809083d8, PC: 0x8017039c
FP: 0x809083e8, PC: 0x8016f764
```

Configuration Register Commands

The virtual configuration register resides in NVRAM. You can display or modify the virtual configuration register from either the ROM monitor or the operating system software.

To change the virtual configuration register from the ROM monitor, enter **confreg** by itself for menu mode, or enter the new value of the register in hexadecimal.

- **confreg** [*hexnum*]—Change the virtual configuration register to the value specified. The value is always interpreted as hexadecimal.

Note Entering **confreg** without an argument displays the contents of the virtual configuration register and prompts you to alter the contents by describing the meaning of each bit. In either case, the new virtual configuration register value is written into NVRAM, but is not effective until you reset or power-cycle the router.

The following display shows an example of the **confreg** command:

```
rommon 7 > confreg

    Configuration Summary
enabled are:
break/abort has effect
console baud: 9600
boot: the ROM Monitor

do you wish to change the configuration? y/n  [n]:  y
enable  "diagnostic mode"? y/n  [n]:  y
enable  "use net in IP bcast address"? y/n  [n]:
enable  "load rom after netboot fails"? y/n  [n]:
enable  "use all zero broadcast"? y/n  [n]:
disable "break/abort has effect"? y/n  [n]:
enable  "ignore system config info"? y/n  [n]:
change console baud rate? y/n  [n]:  y
enter rate: 0 = 9600,  1 = 4800,  2 = 1200,  3 = 2400
            4 = 19200, 5 = 38400, 6 = 57600, 7 = 115200  [0]:  0
change the boot characteristics? y/n  [n]:  y
enter to boot:
 0 = ROM Monitor
 1 = the boot helper image
 2-15 = boot system
    [0]:  0


    Configuration Summary
enabled are:
diagnostic mode
break/abort has effect
console baud: 9600
boot: the ROM Monitor

do you wish to change the configuration? y/n  [n]:


You must reset or power cycle for new config to take effect
```

Using the show rom-monitor command

The **show rom-monitor** command displays the current version of the read-only ROM monitor and, if present displays the upgrade version of the ROM monitor. The upgrade version is selected when the system is rebooted. This command runs in the Cisco IOS EXEC mode.

You get the following output when the read only ROM monitor is present:

```
Router# show rom-monitor

ReadOnly ROMMON version:
System Bootstrap, Version 12.3(4)T, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2001 by cisco Systems, Inc.
No upgrade ROMMON programmed or not yet run
Currently running ROMMON from ReadOnly region
ROMMON from ReadOnly region is selected for next boot
Router#
```

Following is a sample of an output when both the read-only and the upgrade versions of the ROM
monitor are present:

```
Router# show rom-monitor

ReadOnly ROMMON version:
System Bootstrap, Version 12.3(4)T, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2001 by cisco Systems, Inc.
Upgrade ROMMON version:
System Bootstrap, Version 12.3(4)T, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2002 by cisco Systems, Inc.
Currently running ROMMON from Upgrade region
ROMMON from Upgrade region is selected for next boot
Router#
```

Note   You can get the same information if you enter the **showmon** command in ROMMON mode.

Using the upgrade rom-monitor Command

Use the **upgrade rom-monitor** command to upgrade the ROM monitor to a new version. Depending on
where the image is located, use the following commands to upgrade the ROM monitor:

- **upgrade rom-monitor file** *[URL]*
- **upgrade rom-monitor preference** *[readonly | upgrade]*

upgrade rom-monitors file *[URL]* command installs the new version of ROM monitor on the router by
taking the image from the location indicated in the URL. The image is in the form of ".srec' file. It will
then reload the router.

Following is a sample of the output when the upgrade version of ROM monitor is located at
tftp://223.255.254.254/ajayhn/cvg224_RM2.srec:, and the system configuration has not been saved:

```
.Router# upgrade rom-monitor file tftp://223.225.254.254/ajayhn/cvg224_BM2.SREC
Loading ajayhn/Cvg224_RM2.srec from 223.255.254.254 (via FastEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 641719/1283072 bytes]
This command will reload the router. Continue? [yes/no]: y
System configuration has been modified. Save? [yes/no]: y
Building configuration...
Erasing boot flash eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
Programming boot flash pppp
Now Reloading
System Bootstrap, Version 12.3(4)T, RELEASE SOFTWARE (fc1)
TAC Support: http:_//www.cisco.com/tac
Copyright (c) 2001 by cisco Systems, Inc.
Running new upgrade for first time
```

```
System Bootstrap, Version 12.3(4)T, RELEASE SOFTWARE (fc1)
TAC Support: http:_//www.cisco.com/tac
Copyright (c) 2002 by cisco Systems, Inc.
cvg224 processor with 196608 Kbytes of main memory
Main memory is configured to 64 bit mode with parity disabled

Upgrade ROMMON initialized
rommon 1 >
```

Following output example a configuration that has been saved:

```
Router# upgrade rom-monitor file tftp://223.225.254.254/ajayhn/cvg224_BM2.SREC
Loading ajayhn/Cvg224_RM2.srec from 223.255.254.254 (via FastEthernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 641719/1283072 bytes]
This command will reload the router. Continue? [yes/no]: y
Erasing boot flash eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
Programming boot flash pppp
Now Reloading
System Bootstrap, Version 12.3(4)T, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2001 by cisco Systems, Inc.
Running new upgrade for first time
System Bootstrap, Version 12.3(4)T, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2002 by cisco Systems, Inc.
cvg224 processor with 196608 Kbytes of main memory
Main memory is configured to 64 bit mode with parity disabled

Upgrade ROMMON initialized
rommon 1 >
```

Note The **rommon-pref** in ROMMON mode provides the same information as **upgrade rom-monitor preference** command in the Cisco IOS EXEC mode.

Recovering Boot and System Images

If your router experiences difficulties and no longer contains a valid Cisco IOS software image in flash memory, you can recover the Cisco IOS image using one of the following ROM monitor commands:

- **xmodem**—Use this command if the computer attached to your console has a terminal emulator that has xmodem capability.
- **tftpdnld**—Use this command if you have a TFTP server directly connected to a Fast Ethernet port.

Using the xmodem Command

The **xmodem** command establishes a connection between a console and the router console port for disaster recovery, if both the boot and system images are erased from flash memory.

xmodem [*filename*]—Establishes an xmodem connection between the console and the router. The optional parameter *filename* specifies the source file containing the Cisco IOS image.

Other options include the following:

- **-c**—Uses cyclic redundancy check (CRC-16)
- **-y**—Uses Ymodem transfer protocol

- **-r**—Copies the image to DRAM for launch

- **-x**—Does not launch image on completion of download

Using the tftpdnld Command

The **tftpdnld** command downloads a Cisco IOS software image from a remote server into flash memory using TFTP.

tftpdnld—Begins the TFTP copy command.

The following variables are required:

- IP_ADDRESS—IP address for the router you are using.

- IP_SUBNET_MASK—Subnet mask for the router you are using.

- DEFAULT_GATEWAY—Default gateway for the router you are using.

- TFTP_SERVER—IP address of the server from which you want to download the image file.

- TFTP_FILE—Name of the file that you want to download.

The following variables are optional:

- TFTP_VERBOSE—Print setting. 0=quiet, 1=progress, 2=verbose. The default is 1.

- TFTP_RETRY_COUNT—Retry count for ARP and TFTP. The default is 7.

- TFTP_TIMEOUT—Overall timeout of the download operation in seconds. The default is 2400 seconds.

- TFTP_CHECKSUM—Performs a checksum test on the image. 0=no, 1=yes. The default is 1.

The syntax for specifying the variables is:

```
VARIABLE_NAME=value
```

After you specify the variables, you must reenter the **tftpdnld** command. For example:

```
rommon 1 > tftpdnld

rommon 2 > IP_ADDRESS=172.15.19.11
rommon 3 > IP_SUBNET_MASK=255.255.255.0
rommon 4 > DEFAULT_GATEWAY=172.15.19.1
rommon 5 > TFTP_SERVER=172.15.20.10
rommon 6 > TFTP_FILE=/tftpboot/cVG224-i-mz
rommon 7 > TFTP_VERBOSE=1

rommon 8 > tftpdnld

    IP_ADDRESS=172.15.19.11
    IP_SUBNET_MASK=255.255.255.0
    DEFAULT_GATEWAY=172.15.19.1
    TFTP_SERVER=172.15.20.10
    TFTP_FILE=/tftpboot/VG224-i-mz
    TFTP_VERBOSE=1

Invoke this command for disaster recovery only.
WARNING: all existing data in flash will be lost!
Do you wish to continue? y/n: [n]:
```

Enter **y** to begin downloading the Cisco IOS software image. When the process is complete, the ROM monitor mode prompt appears on your screen.

INDEX